REMARKS

The Present Invention

The present invention is directed to polymeric compositions capable of releasing nitric oxide. The compositions comprise a biopolymer and a nitric oxide-releasing $N_2O_2^-$ functional group. The present invention is also directed to pharmaceutical compositions comprising such polymeric compositions and methods of treating biological disorders in a mammal in which dosage with nitric oxide is therapeutic.

The Pending Claims

Claims 1, 5-15, 19-28 and 31-38 are currently pending. Claims 1 and 5-14 are directed to polymeric compositions. Claims 15 and 19-26 are directed to pharmaceutical compositions. Claims 27, 28 and 31-38 are directed to the method of treating biological disorders in a mammal.

The Amendments to the Specification

The specification was amended to insert the title of the invention and to clarify the "Related Application" section. No new matter has been added by way of these amendments.

The Office Action

The Office has restricted the claims as follows:

(i) claims 1-26, class 424, subclass 78.08, and

(ii) claims 27-38, class 514, subclass 921.

In addition, the Office has requested elections of species of nitric oxide-releasing group and biopolymeric backbone. Reconsideration of the requirements for restriction and election of species is hereby requested.

The Office has rejected the claims as follows:

(i) claims 1, 5-15, 19-27 and 31-38 have been rejected as comprising improper Markush groups;

(ii) claims 1, 5-15, 19-27 and 31-38 have been rejected under 35 U.S.C. § 112, second paragraph; and

(iii) claims 1, 5-15, 19-27 and 31-38 have been rejected under 35 U.S.C. § 103(a).

Reconsideration of these rejections is hereby requested.

Discussion of Requirements
for Restriction and Election of Species

The Office has restricted the claims as follows:

(i) claims 1-26, class 424, subclass 78.08, and

(ii) claims 27-38, class 514, subclass 921.

In addition, the Office has requested provisional elections of species of nitric oxide-releasing group and biopolymeric backbone.

In response to the requirement for restriction and election of species, Applicants point out that claims 2-4, 16-18 and 28-30 were canceled by way of the preliminary amendment of April 22, 1997, and elect with traverse the claims of group (i) and the species of formula VIII, wherein R_1 and R_2, together with the nitrogen atom to which they are bonded, form a piperazino group as the nitric oxide-releasing group and the species nucleic acid as the biopolymeric backbone. The requirements for restriction and election of species are traversed for the reasons set forth below.

Applicants submit that there are two criteria for a proper requirement for restriction between patentably distinct inventions:

(i) the inventions must be independent or distinct as claimed, and

(ii) there must be a serious burden on the Examiner if restriction is not required. M.P.E.P. § 803. "If the search and examination of an entire application can be made without serious burden, the Examiner must examine it on the merits, even though it includes claims to distinct or independent inventions." M.P.E.P. § 803.

Here, the Examiner has failed to meet the second criterion for a proper requirement for restriction between

patentably distinct inventions by not even so much as asserting, let alone demonstrating, that there would be a serious burden on the Examiner if restriction were not required. In this regard, Applicants submit that searching a single subclass in each of two classes does *not* constitute a "serious burden" on the Examiner. The burden on the Examiner in searching the claims of groups (i) and (ii) together is no greater than the burden on the Examiner when faced with examination of a single group requiring searching in two subclasses, whether of the same class or two different classes. Accordingly, the requirement for restriction is improper and should be withdrawn.

Discussion of Markush Rejection

The Office has rejected claims 1, 5-15, 19-27 and 31-38 as comprising improper Markush groups. The Office contends that the claims define patentably distinct polymeric derivatives whose properties can not be predicted as equivalent. This rejection is traversed.

Applicants submit that, although the claims may define patentably distinct polymeric derivatives, the claims do not comprise improper Markush groups inasmuch as all of the polymeric derivatives encompassed by any given claim are characterized by the capacity to release nitric oxide. Given that all of the polymeric derivatives claimed have this characteristic in common, Applicants submit that the rejection based on improper Markush groups is improper and request withdrawal of this rejection.

Discussion of Rejection
under 35 U.S.C. § 112, second paragraph

The Office has rejected claims 1, 5-15, 19-27 and 31-38 under Section 112, first paragraph, as unclear in chemical formula. Specifically, the Office contends that the polymer-nitric oxide releasing group formulas of the claims do not comprise a clearly described bond of either of the polymer or

the linked NO group. This rejection is traversed for reasons set forth below.

The specification clearly states that the $N_2O_2^-$ functional groups are "bound to the polymer." "Bound to the polymer" is defined as associated with, part of, incorporated with or contained within the polymer physically or chemically. Bonding of the $N_2O_2^-$ functional group to the polymer can be achieved by covalent bonding of the $N_2O_2^-$ group to the polymer directly or by covalent bonding of the $N_2O_2^-$ group to the polymer through a linking group X or X'. Chemical bonding of the $N_2O_2^-$ functional group to the polymer can be by, for example, covalent bonding of the linking group X or X' to the polymer such that the linking group forms part of the polymer itself, i.e., is in the polymer backbone, or is attached to a pendant group on the polymer backbone. The specification further states that the manner in which the nitric oxide-releasing $N_2O_2^-$ functional group is associated with, part of, incorporated with or contained within, i.e., "bound," to the polymer, is inconsequential to the present invention and all means of association, incorporation and bonding are contemplated (see, for example, page 6, line 18, through page 7, line 10, page 15, line 30, through page 17, line 12, page 19, line 17, through page 20, line 21, and the Examples).

In view of the above, Applicants submit that the chemical formulas set forth in the claims are not unclear. Accordingly, Applicants request withdrawal of this rejection.

Discussion of Rejection under 35 U.S.C. § 103(a)

The Office has rejected claims 1, 5-15, 19-27 and 31-38 under Section 103(a) as obvious in view of and, therefore, unpatentable over Mitchell et al. According to the Office, the claimed compositions are indistinguishable from the NO complexes of Mitchell et al. inasmuch as the use of NO species with biopolymer is considered to be a matter of routine derivatization. This rejection is traversed for reasons set forth below.

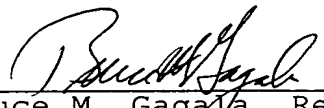
Mitchell et al. is directed to five-membered oxazolidine-3-oxyl and five- and six-membered cyclic nitroxides (see Tables I and II on page 2804 of Mitchell et al.). Mitchell et al. is not directed to compounds containing $N_2O_2^-$ functional groups, which spontaneously release NO under physiological conditions in the presence or absence of oxygen, biopolymers comprising such compounds, and non-biopolymers comprising such biopolymers as taught by the present invention. Accordingly, there is no teaching or suggestion in Mitchell et al. to use such compounds, let alone to generate biopolymers comprising such compounds, as taught by the present invention.

In view of the above, Applicants submit that Mitchell et al. does not render the present invention obvious. Accordingly, Applicants request withdrawal of this rejection.

Conclusion

In view of the above remarks, the application is considered to be in good and proper form for allowance and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of this application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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Date: February 13, 1998

In re Appln. of Saavedra et al.
Serial No. 08/837,812

CERTIFICATE OF MAILING

I hereby certify that this AMENDMENT (along with any documents referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Date: February 13, 1998

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